

MISSION SERVICES PROGRAM OFFICE

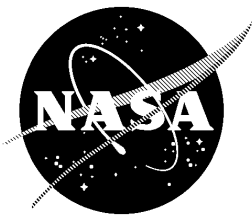
Space Network Access System (SNAS) Product Management Plan

Original

January 2004

Effective Date: TBD

Expiration Date: TBD



National Aeronautics and
Space Administration

————— Goddard Space Flight Center —————
Greenbelt, Maryland

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Space Network Access System (SNAS) Product Management Plan

Original

January 2004

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Preface

This document is under the configuration management of the Space Network (SN) Project Office Configuration Control Board (CCB).

Configuration Change Requests (CCRs) to this document shall be submitted to the SN Project CCB, along with supportive material justifying the proposed change. Changes to this document shall be made by document change notice (DCN) or by complete revision.

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Change Information Page

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DCN Control Sheet

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Page/Section	TBD/TBR	Explanation
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Section 1. Introduction

1.1 Purpose

The purpose of the Space Network Access System (SNAS) is to provide a single, universally accessible, low-cost, and standards-based customer interface for performing Tracking and Data Relay Satellite System (TDRSS) scheduling and real-time service monitoring and control. The SNAS will consolidate the functionalities of the SN Web Services Interface (SWSI) system and the User Planning System (UPS) into a single system, and will replace the UPS and SWSI as the premiere customer access system for managing TDRSS resources. As a result, the SN will provide a single, flexible tool to the customer that is capable of supporting the diverse needs of the SN customer community.

1.2 Background

The SN, under the direction of the National Aeronautics and Space Administration (NASA) Goddard Space Flight Center (GSFC) Mission Services Program (MSP), provides data relay services to customers by operating as a bent pipe relay system between customer platforms and customer ground facilities. The elements of the SN that perform these services are known as the TDRSS, which consists of a constellation of Tracking and Data Relay Satellites (TDRS) and the White Sands Complex (WSC). The WSC consists of three ground terminals, the White Sands Ground Terminal (WSGT), the Second TDRSS Ground Terminal (STGT), and the Guam Remote Ground Terminal (GRGT).

The scheduling and real-time monitoring and control interface between a customer Mission Operations Center (MOC) and the TDRSS is through either the Network Control Center Data System (NCCDS), located in the Data Services Management Center (DSMC), or the Demand Access System (DAS). The interface between the customer MOC and the NCCDS consists of electronically exchanged formatted messages. This interface is described in detail in 451-ICD-NCCDS/MOC, Interface Control Document Between the Network Control Center Data System and the Mission Operations Centers. The customer MOC interface to the DAS is currently provided through SWSI, and is described in detail in 453-ICD-DAS/SWSI, Interface Control Document (ICD) between Demand Access System (DAS) and Space Network (SN) Web Services Interface (SWSI).

A full-featured SN scheduling tool is provided to customers by the UPS. New SN customers desiring to use UPS for scheduling must either purchase their own system at a cost of approximately \$35,000 per system, or interface with an institutional UPS located within the Multisatellite Operations Control Center (MSOCC). A NASA Integrated Service Network (NISN) Closed Internet Protocol (IP) Operational Network (IONet) connection is required for the latter option. Another limitation of the UPS is that it does not provide an interface to the DAS.

SWSI provides to SN customers a standard, readily available, low-cost, and portable tool that permits customers to perform scheduling, real-time functions, and state vector storage for only the cost of a desktop computer or workstation. SWSI also serves as the customer interface to DAS, and is accessible from either the NISN Closed IONet or Open IONet. SWSI, however, is not fully-featured, and restricts customers to a limited number of scheduling capabilities.

1.3 Overall Approach

The approach of the SNAS Product development and deployment is to establish a capability for performing network-based SN customer scheduling and real-time functions that consolidates the functionalities of both SWSI and UPS. SNAS will be developed to support all current SN customers, to include scientific robotic missions, the Space Transportation System (STS), the International Space Station (ISS), and Special Projects. In addition, SNAS will be developed to support new SN customers, such as the National Polar-orbiting Operational Environmental Satellite System (NPOESS). The basic SNAS infrastructure will provide for secure message exchange on all NISN and open networks and will implement the complete NCCDS and DAS customer interfaces. Commercial Off-The-Shelf (COTS) products (hardware, system software, database tools, and security tools) will be used to the extent possible. Much of the SNAS effort will consist of custom software development to be performed by an implementation contractor.

1.4 Timeframe

The SNAS Product development and deployment is projected to commence in the 1st quarter of calendar year (CY) 2004 and complete in the 1st quarter of CY 2006.

Section 2. Goals and Objectives

2.1 Goals and Objectives

The goals and objectives of the SNAS Product are:

- a. Provide a standards-based interface to the NCCDS and the DAS to perform customer scheduling and real-time service monitoring and control.
- b. Support all full-support customer messages as defined in 451-ICD-NCCDS/MOC.
- c. Allow access from the NISN Closed IONet, the NISN Open IONet, and the public Internet.
- d. Securely increase SN availability and reliability to customers.
- e. Provide for platform independence and easy system setup.
- f. Implement the SNAS Product while minimizing acquisition, development, and life cycle cost.

2.2 Basic Approach to Meeting Goals and Achieving Objectives

The basic approach for achieving SNAS goals and objectives will be to use implementation contractor resources to design and build the SNAS system. The SNAS implementation will use a combination of existing designs and new designs. The majority of the SNAS Product will consist of custom software development. COTS products will be used as much as possible.

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Section 3. Customer Definition and Advocacy

3.1 Current Customer Base

A SNAS customer base already exists in the current UPS and SWSI customer bases, and with those customers that use unique or UPS-based scheduling systems.

The current UPS customer base consists of the following:

- a. Tropical Rainfall Measuring Mission (TRMM)
- b. Earth Radiation Budget Satellite (ERBS)
- c. Upper Atmosphere Research Satellite (UARS)
- d. X-Ray Timing Explorer (XTE)
- e. International Space Station Program (ISS)
- f. Space Station Program (SSP)
- g. Hubble Space Telescope (HST)
- h. Landsat-7

The current SWSI customer base consists of the following:

- a. Airlink
- b. Swift Gamma Ray Burst Explorer
- c. Long Duration Balloon Program (LDBP) and Ultra Long Duration Balloon Program (ULDBP)
- d. Communications and Navigation Demonstrations on Shuttle (CANDOS)
- e. Solar Radiation and Climate Explorer (SORCE)

Customers which use unique or UPS-based SN interfaces consist of the following:

- a. Special Projects and Missions (SPM)
- b. Earth Observing System (EOS) – Terra
- c. EOS – Aqua
- d. EOS – Aura
- e. Fast Auroral Snapshot Explorer (FUSE)
- f. Thermosphere, Ionosphere, Mesosphere Energetics and Dynamics (TIMED)

3.2 Expected/Projected Customer Base

The following are projected to become SWSI customers:

- a. Astro-rivelatore Gamma a Immagini LEggero (AGILE)
- b. EOS – Aqua
- c. EOS – Aura
- d. Communication/Navigation Outage Forecasting System (C/NOFS)

- e. Gamma-ray Large Area Space Telescope (GLAST)
- f. Global Precipitation Measurement (GPM) –1, 2, and European Space Agency (ESA) GPM
- g. Landsat-7
- h. Ocean Topography Experiment (TOPEX)
- i. Galaxy Evolution Explorer (GALEX)
- j. Microwave Anisotropy Probe (MAP)
- k. Gravity Probe-B (GP-B)

Section 4. Management

4.1 General

To achieve the SNAS development and deployment objectives, a management approach is being adopted that capitalizes on experience gained from the SWSI Product and the Network Control Center (NCC) Project. This approach will employ an existing management structure with the authority and responsibility residing with the SNAS Product Manager. Other resources will be utilized when appropriate.

4.2 Authority

Authority for this activity is 452-PCD-SNAS, the Space Network Project Commitment Document (PCD) for the Space Network Access System (SNAS).

4.3 Product Team Structure and Distribution of Responsibilities

The SNAS Product organizational relationships and matrixed personnel are shown in Figure 4-1. The functional responsibilities of key personnel for SNAS are shown in Table 4-1. Definitions of these functional responsibilities are provided below. In Table 4-1, an "X" represents the assignment of principal responsibility for the given function. A "C" represents the assignment of co-responsibility for the function. A co-responsible individual or organization is responsible for certain aspects of a function under the guidance of the principal individual or organization. An "A" indicates that the designated individual or organization will provide assistance as required in the fulfillment of the given function. In functional areas for which both NASA and the SNAS implementation contractor have been assigned principal responsibility, the implementation contractor will be responsible for the actual implementation of that function and NASA will be responsible for the management and/or oversight of the function.

4.3.1 Definitions

Product Management - Ensure the performance of all management functions necessary for delivery of the SNAS Product. Direct and control system definition, design development, and validation of the system. Develop and implement the Product Plan to define the schedules and to identify, justify, allocate, obligate, account, and manage fiscal and human resources (civil service and contractor) necessary to deliver the SNAS Product. Liaison with other NASA programs and offices is performed under this responsibility.

Cost/Schedule Control - Establish and support a formal performance measurement system that will realistically monitor the actual work completed versus the budget and schedule agreements. Prepare all financial and schedule performance and status reports to permit upper levels of management to exercise necessary cost/schedule control over the SNAS Product.

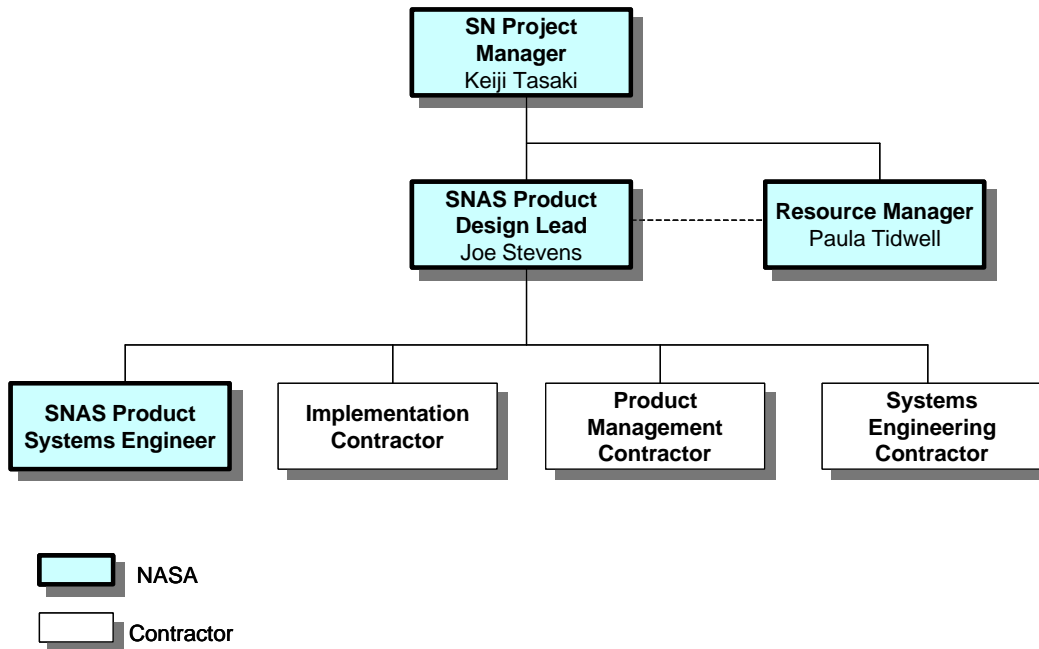


Figure 4-1. SNAS Organization

Configuration Management – Maintain system requirements and documentation baselines in a disciplined and traceable manner to support the development and delivery of the Product. This term also applies to the change control process(es) applicable to the integrity of each deliverable software subsystem.

Requirements, Specifications, and ICDs - Establish and maintain all system requirements for the Product. Allocate system functional and performance requirements and specifications to hardware and software functions; generate software requirements specifications and software interface requirements specifications. Approve all hardware and software design specifications.

Design – Perform and maintain the system design necessary to meet the overall SNAS specifications. Conduct all design reviews.

Verification Planning – Generate all system level test plans and supporting documentation. Conduct system level performance analyses to ensure that the SNAS will demonstrate that all requirements have been met. Approve system level test procedures. Approve all hardware and software configuration item test plans and procedures.

Table 4-1. Functional Responsibility Matrix

	SNAS PRODUCT DESIGN LEAD (NASA)	RESOURCE MANAGER (NASA)	SNAS PRODUCT SYSTEMS ENGINEER (NASA)	PRODUCT MANAGEMENT CONTRACTOR	SYSTEMS ENGINEERING CONTRACTOR	IMPLEMENTATION CONTRACTOR
Product Management	X					X
Cost/Schedule Control	X	C				X
Configuration Management	X		A	C	A	X
Requirements, Specifications, & ICDs	X		C		C	X
Design			X			X
Verification Planning	A		X		A	X
Security			X		A	X
Development	X		C			X
Integration and Test			X		A	X
Installation and Installation Test			X		A	X
Acceptance Tests	A		X		A	X
Training	X					X
Integrated Logistics Support Planning	X				A	X
Product Assurance	X		A		A	X
Operations and Maintenance Concept	X		A			X
Transition to Operations	X		A	A	C	X
X = Principal Responsibility C = Co-Principal Responsibility A = Assist						

Security – Ensure equipment, material, and procedures are present which provide personnel, physical, communications, computer, and information security in accordance with NASA and Designated Approving Authority (DAA) directives and guidance. Perform a security assessment at the appropriate point.

Development – Develop and build hardware, software and firmware systems to meet requirements. Perform appropriate subunit tests. Maintain development documentation for all new development items. Prepare appropriate engineering changes.

Integration and Test – Integrate and test each deliverable subsystem.

Installation and Installation Test - Perform the installation of the deliverable system(s) at the appropriate sites. Conduct tests on systems and components to identify any damage due to shipping, and to verify that assembly and integration procedures have been correctly performed.

Acceptance Tests – Conduct system and subsystem tests to verify and validate adherence to requirements.

Training - Develop plans and procedures to ensure all Operations and Maintenance (O&M) of the SNAS are performed in a safe and satisfactory manner. Classroom training and actual equipment training are included in this responsibility.

Integrated Logistics Support Planning - Provide logistics support to the SNAS Product effort including provision of spare mechanical and electronic parts and the procurement of equipment and materials necessary to support operation and maintenance functions.

Product Assurance - Control all phases of SNAS Product development to ensure that systems meet the standards and tolerances as required by 450-PG-8730.3.1, the MSP Quality Assurance Plan.

Operations and Maintenance Concept – Develop plans and concepts to operate and maintain the SNAS within the SN. Develop plans and procedures to conduct corrective and preventive maintenance on all systems and subsystems.

Transition to Operations – Perform activities that are necessary to deploy SNAS to make it available to support SN customers. Support the transition of existing SN customer support from SWSI and UPS to SNAS.

4.3.2 Paths of Communication Among Organizations

Clear paths of communication will be established among SNAS Product organizations. These communication paths will be maintained through the entire duration of the SNAS Product design and implementation. The primary NASA point of contact for all SNAS-related activities is the SNAS Product Design Lead (PDL). Communication methods will include, but not be limited to, teleconferences, e-mail, memorandums, and personal interaction/meetings. Technical interchanges and status reports will be prepared in accordance with Section 17 of this document. Additional reports will be prepared as directed by the SNAS PDL.

4.3.3 NASA Responsibilities

The SNAS PDL will be appointed by the SN Project Manager under the GSFC Quality Management System (QMS). NASA personnel will be matrixed to the SNAS Product as required. The functional responsibilities of key NASA personnel for SNAS are shown in Table 4-1.

4.3.4 Contractor Responsibilities

Implementation activities (design, development, integration, test, and transition to operations) will be implemented through the Near Earth Networks Services (NENS) contract. Product management support and systems engineering support will be performed under the MSP Systems Engineering Support (SES) contract. Configuration management (CM) and data management (DM) support will be performed under the Program Analysis and Control (PAAC-II) contract. The functional responsibilities of key contractor personnel are shown in Table 4-1.

4.4 Risk Management

The technical risk associated with SNAS development is low, since established technology has been applied from the outset. An extensive amount of experience has been gained during the development and implementation of the SWSI Product and the NCC Project.

SNAS will follow a continuous risk management process throughout the SNAS life cycle in accordance with 450-RMP-MSP, the Risk Management Plan for the Mission Services Program. The process will begin with an identification of risk issues and concerns, and will continue with risk analysis, planning, tracking, and control. Items that are deemed necessary for closely monitoring are described in Table 4-2. Items resulting from reviews and periodic status meetings that merit attention will be added or deleted from this list as required.

Table 4-2. Risk Management Matrix

<i>Risk</i>	<i>Impact</i>	<i>Level</i>	<i>Mitigation</i>
SNAS Interface Testing with DAS	A potential resource conflict exists between DAS customers and the SNAS development team. Both may desire to utilize the DAS for interface testing at the same time.	Moderate	SNAS verification planning will factor in at the earliest possible time the SN customer utilization schedule of the DAS. Coordination with the WSC O&M personnel managing the DAS will be conducted throughout verification planning to minimize the possibility of schedule conflicts with DAS customers.
Customer Operations Impact on SNAS Activities	Customer operations activities (e.g., STS freeze periods) could cause delays in completing SNAS Product activities.	Moderate	The SNAS staff will regularly communicate with SN customers, monitor customer launch activities (to include freeze and critical periods), and plan Product activities accordingly. Freeze exemptions will be coordinated as required.
Interference Between Customer Critical Activities and the SNAS Test Schedule	Customer lack of availability to test with SNAS due to other high priority customer activities or implementation issues at the customer site could delay the completion of SNAS interface testing.	Moderate	Identification of all potential customers that will be involved in the SNAS test program will be identified early. Also, the tests that are key to validating SNAS functionality versus those that can be completed as a customer post-SNAS transition activity will also be identified. The SNAS staff will regularly communicate with customers and will request a commitment from those agreeing to participate during the SNAS test period.
SN Customer Transition from UPS and SWSI to SNAS	An ineffective transition from UPS and SWSI to SNAS could potentially impact SN customer service support.	Low	A period of time for transitioning SN customers from UPS and SWSI to SNAS has been provided in the schedule. The SNAS system engineering support contractor will develop a plan early during SNAS development to facilitate a smooth transition.
Port of SWSI High Availability Applications to Sun Hardware to Linux-based Hardware	Linux-based servers are being considered for SNAS to reduce maintenance costs. An inability of this type of workstation to support the high availability applications currently on SWSI could impact SNAS reliability and availability.	Low	This issue will be explored early in the SNAS design phase. A study and/or a lab prototype will be conducted to determine a Linux-based system's capability to support high availability applications.

Section 5. Controls

5.1 Product Design Lead Controls

The SNAS PDL will exercise control of the implementation budget, schedules, procurements, risk management planning, requirements performance, and baseline documents. This control will be maintained through the configuration management process defined in paragraph 5.3 below, the performance assurance process defined in Section 11 of this document, regular technical status meetings, regular performance/financial reviews, and an action item reporting system. A Work Order Authorization (WOA) document is not required for the SNAS Product.

5.2 Configuration Management

This document, 452-SRD-SNAS, the SNAS System Requirements Document (SRD), 452-ICD-DAS/SNAS, the DAS-SNAS ICD, and 452-OCD-SNAS, the SNAS Operations Concept Document (OCD), are under the configuration management of the SN Project Office CCB, in accordance with the process defined in 450-PG-1410.2.1, Mission Services Program Configuration Management Procedure.

For all other SNAS documents, a SNAS CCB will be established. The SNAS PDL will function as the head of this board and will have final approval authority over all other SNAS Product documents and CCRs. The SNAS CCB will perform its responsibilities in accordance with the process defined in 450-PG-1410.2.1.

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Section 6. Technical Summary

6.1 General

The SNAS Product implementation will result in a low-cost, network-based, cross-platform solution for scheduling SN services that will meet the needs of current and future UPS and SWSI customers.

6.2 Reference Architecture

Figure 6-1 depicts the overall SNAS architecture. SNAS customers will be provided with client software capable of executing on multiple platforms. Clients will establish connections to SNAS using the Secure Socket Layer (SSL)/Transmission Control Protocol (TCP) and authentication with digital certificates. Two sets of SNAS servers are provided to allow access from clients via both the Open IONet and the Closed IONet. The Open SNAS Server will act as a proxy, routing requests from the Open IONet and Internet-based customers to the Closed SNAS Server using authenticated connections through the NISN Secure Gateway.

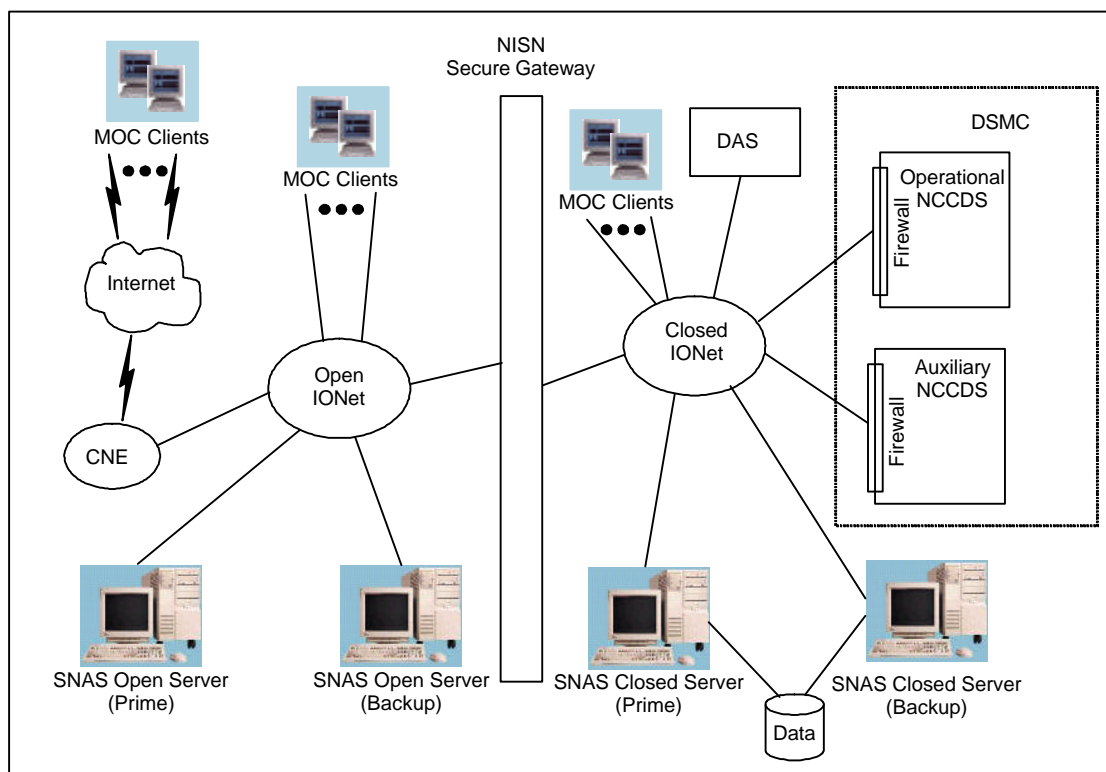


Figure 6-1. SNAS Reference Architecture

The Closed SNAS Server establishes the appropriate TCP connections with the NCCDS and the DAS and performs an exchange of messages according to the formats defined in 451-ICD-NCCDS/MOC and 452-ICD-DAS/SNAS, respectively (see paragraph 6.4 below). Schedule information returned from the NCCDS and the DAS is stored in a database on the Closed SNAS Server for later customer viewing.

6.3 Operations Concept

The SNAS Operations Concept is defined in a separate document.

6.4 Technical Design Interfaces

The SNAS technical design interfaces will conform to the requirements defined in the following documents:

- a. 451-ICD-NCCDS/MOC, Interface Control Document Between the Network Control Center Data System and the Mission Operations Centers.
- b. 452-ICD-DAS/SNAS, Interface Control Document (ICD) between Demand Access System (DAS) and Space Network Access System (SNAS).

6.5 Facilities

The SNAS will be housed within the DSMC, located at the WSC, near Las Cruces, New Mexico. No significant facility modifications are required for this installation. Minor modifications may include adding a connection to the Open IONet, running new cables from the SNAS servers to the NISN routers, and adding racks or tables. Power will be drawn from existing Technical Power panels and power and power cables will be routed primarily in existing cableways. Where necessary, the SNAS may require new power outlet boxes and cable hangers within the existing underfloor infrastructure.

6.6 Logistics

The implementation contractor will assist the SNAS O&M staff in defining the logistics requirements of the SNAS. The following elements will be assessed:

- a. Maintenance planning.
- b. Sparing plan.
- c. Supply, product, and sales support.
- d. Support and test equipment.
- e. Packaging, handling, storage, and transportation.
- f. Training and logistics support personnel.
- g. Government furnished and contractor furnished equipment.
- h. Technical data and documentation.

Section 7. Schedule

<i>Milestone/Task</i>	<i>Date(s)</i>
System Requirements Review (SRR)	July 2003
Product Implementation Start	March 2004
Detailed Design	March 2004 – October 2004
Preliminary Design Review (PDR)	June 2004
Critical Design Review (CDR)	October 2004
Development:	-
Code and Test	October 2004 – August 2005
System Testing	September – November 2005
System Shipment and Installation	November 2005
Test Readiness Review (TRR)	December 2005
Final Acceptance Testing	December 2005
Training and Documentation Close-out	January 2006
Operations Readiness Review (ORR)	February 2006
Transition to Operations	February – May 2006

Figure 7-1. SNAS Product Schedule

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Section 8. Resources

8.1 Product Budget

SNAS funding requirements are based on the preliminary SNAS in-house cost estimate. Funding will be provided under UPN (**TBD**).

8.2 Labor Requirements

An estimate of Civil Service requirements is provided in Table 8-1. This estimate is based on past SWSI Product and NCC Project experience.

Table 8-1. Detailed Labor Requirements – Civil Service

<i>POSITION</i>	<i>FY 2004</i>	<i>FY 2005</i>	<i>FY 2006</i>	<i>TOTAL</i>
SNAS Product Design Lead	0.7	0.7	0.3	1.7
Resource Manager	0.1	0.1	0.1	0.3
Product Systems Engineer	1.0	1.0	0.3	2.3
<i>TOTAL</i>	1.8	1.8	0.7	4.3

8.3 Cost Estimates

The cost estimates for the SNAS Product are available from the SNAS PDL.

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Section 9. Implementation Approach

9.1 Implementation Approach

The SNAS will be developed and integrated into SN operations via a task under the NENS contract. SNAS requirements will be defined, documented, and reviewed. Appropriate requirements reviews, design reviews, and test readiness reviews will be conducted.

9.2 Product Work Breakdown Structure (WBS)

The SNAS implementation is organized under a Product WBS, shown in Figure 9-1. The Product WBS covers the work done under the systems engineering and implementation contracts, together with Product management and the portions of the systems engineering efforts that are supported in-house. Each contractor supporting SNAS is required to develop a contractor WBS covering the elements of the Product WBS allocated to the contractor. The SNAS Product WBS Dictionary, which defines the work in each WBS element, is provided below.

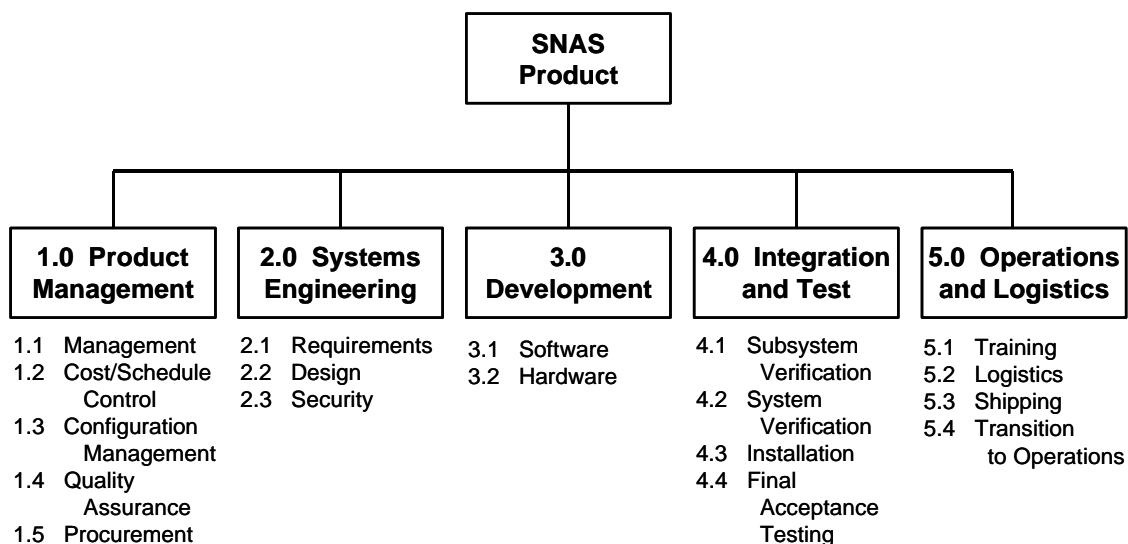


Figure 9-1. SNAS Work Breakdown Structure

9.3 Relationship of WBS to Product Team Structure

Table 9-1 presents a responsibility matrix showing how WBS elements are assigned within the SNAS Product implementation team. An “X” represents the assignment of

Table 9-1. SNAS WBS Responsibility Matrix

WBS Element			Product Design Lead (NASA)	Resource Manager (NASA)	Product Systems Engineer (NASA)	Product Management Contractor	Systems Engineering Contractor	Implementation Contractor
1.0		Product Management						
	1.1	Management	X					X
	1.2	Cost/Schedule Control	X	C				X
	1.3	Configuration Management	X		A	C	A	X
	1.4	Quality Assurance	X		A		A	X
	1.5	Procurement	X	C				X
2.0		Systems Engineering						
	2.1	Requirements	X		C		C	X
	2.2	Design			X			X
	2.3	Security			X		A	X
3.0		Development						
	3.1	Software	X		C			X
	3.2	Hardware	X		C			X
4.0		Integration and Test						
	4.1	Subsystem Verification			X		A	X
	4.2	System Verification			X		A	X
	4.3	Installation			X		A	X
	4.4	Final Acceptance Testing			X		A	X
5.0		Operations and Logistics						
	5.1	Training	X					X
	5.2	Logistics	X				A	X
	5.3	Shipping	X					X
	5.4	Transition to Operations	X		A	A	C	X

principal responsibility for the given function. A “C” represents the assignment of co-responsibility for the function. A co-responsible individual or organization is responsible for certain aspects of a function under the guidance of the principal individual or organization. An “A” indicates that the designated individual or organization will provide assistance as required in the fulfillment of the given function. In functional areas for which both NASA and the SNAS implementation contractor have been assigned principal responsibility, the implementation contractor will be responsible for the actual implementation of that function and NASA will be responsible for the management and/or oversight of the function.

9.4 WBS Dictionary

1.0 Product Management – The organization, leadership, reporting, and cost/schedule control of the SNAS Product. This WBS element is the focal point for resource management, system configuration control, and quality assurance.

1.1 Management – Ensure the performance of all management functions necessary for delivery of the SNAS deliverables. Direct and control system definition, requirements, design development, and validation. Develop and implement plans to define schedules and to identify, justify, allocate, obligate, account, and manage fiscal and human resources necessary to deliver the SNAS Product. Execute liaison functions with other organizations.

1.2 Cost/Schedule Control – Establish and support a formal performance measurement system that will realistically monitor the actual work completed versus the budget and schedule agreements. Prepare all financial and schedule performance status reports to permit management to exercise necessary cost/schedule control over the SNAS Product.

1.3 Configuration Management (CM) – Maintain system requirements and documentation baselines in a disciplined and traceable manner to support the development and delivery of the Product. Procedures and guidelines are described in 450-PG-1410.2.1.

1.4 Quality Assurance (QA) – The control of all phases of SNAS development to ensure that all hardware and software meet the standards and tolerances as required by 450-PG-8730.3.1, the MSP Quality Assurance Plan.

1.5 Procurement – Obtain equipment, materials, and software to satisfy need dates for the SNAS Product.

2.0 Systems Engineering – The definition and satisfaction of SNAS system requirements and interfaces. The integration of the SNAS subsystems with each other and the SNAS with other SN elements.

2.1 Requirements – Establish and maintain all system requirements and system interface control documents for the Product. Allocate system functional and performance requirements and specifications to hardware and software subsystems;

generate subsystem requirements and interface control documentation as necessary. Conduct a system requirements review.

2.2 Design – Perform and maintain the system design necessary to meet the overall SNAS Product requirements. Conduct a system design review.

2.3 Security – Equipment, material, and procedures necessary to provide personnel, physical, communications, computer, and information security in accordance with NASA directives and guidance.

3.0 Development – Subsystem requirements specification, design, test requirements, and documentation for SNAS Product hardware and software.

3.1 Software - Subsystem requirements specification, design, coding, and documentation for SNAS software.

3.2 Hardware - Subsystem requirements specification, design, implementation, and documentation for SNAS hardware.

4.0 Integration and Test – Develop verification plans and detailed, step-by-step procedures for the SNAS system and each SNAS subsystem. Test each SNAS subsystem, and integrate and test the SNAS system. Formally document all verification results. Maintain verification reports as a quality record.

4.1 Subsystem Verification – Integrate and test each SNAS subsystem. Develop verification plans and detailed, step-by-step procedures for each subsystem. Formally document all verification results. Maintain verification reports as a quality record.

4.2 System Verification – Integrate and test the SNAS system. Develop a system-level verification plan and detailed, step-by-step procedures. Formally document all verification results. Maintain verification reports as a quality record.

4.3 Installation – Perform the installation of the deliverable SNAS system at the SNAS site.

4.4 Final Acceptance Verification – Conduct final acceptance testing of the SNAS Product as an integrated system into the SN. Develop a final acceptance test plan and detailed, step-by-step procedures. Formally document all verification results. Maintain verification reports as a quality record. Conduct a test readiness review prior to the start of final acceptance verification.

5.0 Operations and Logistics – The development of operations plans, training and certification plans, maintenance plans, logistics support plans, and all procedures needed for the O&M of the SNAS Product.

5.1 Training – Develop plans, procedures, and training materials for the providing of training to SNAS O&M personnel regarding the maintenance and operation of the SNAS system and component subsystems. The conduct of classroom training and training on actual equipment are included in this WBS element.

5.2 Logistics – Provide logistics support to the SNAS Product, including provision of spare parts and the procurement of equipments and materials necessary to support SNAS O&M.

5.3 Shipping – Disassemble the deliverable system, package, ship to the SNAS site, unpack, and place the SNAS equipment.

5.4 Transition to Operations – Perform planning and coordination to ensure that all requirements are met to successfully transition the SNAS Product from the implementation phase to the operations phase. Prepare agreements and plans required for transition to operations. Conduct an operations readiness review. Support the transition of existing SN customer service support from SWSI and UPS to SNAS.

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Section 10. Acquisition Summary

10.1 General

SNAS Product acquisition will occur through existing NASA contract vehicles, as described below.

10.2 SNAS Implementation

SNAS Product implementation activities will be performed under the NENS contract. The implementation contractor will provide the material, equipment, services, and personnel necessary to plan and accomplish the implementation and transition to operations of the SNAS as defined in the SNAS Implementation Task Order and 452-SRD-SNAS.

Required SNAS implementation documentation deliverables are shown in Table 10-1. A description of each deliverable is provided in Appendix A of this document.

10.2.1 Implementation Contractor Product Management

The implementation contractor will appoint a Product Manager, who will have the authority to direct Product activities and serve as the primary implementation contractor point of contact with the NASA SNAS PDL. The implementation contractor will develop a WBS covering the elements of the Product WBS (see Figure 9-1) allocated to the contractor. This WBS will be used for cost reporting to NASA. The implementation contractor will prepare a PMP and a Master Integrated Schedule, and deliver the documents at the scheduled times as shown in Table 10-1.

10.2.1.1 Product Reviews

The implementation contractor will prepare and conduct the SNAS Product reviews described in Section 17 of this document, with the exception of the SRR, which will be conducted by the SNAS PDL and the systems engineering support contractor prior to the start of SNAS implementation. The scheduled dates for the PDR, CDR, TRR, and ORR are provided in Section 7 of this document. The specific dates for the Monthly Status Reviews (MSRs) will be determined by the SNAS PDL.

10.2.1.2 Configuration and Data Management

The implementation contractor will establish and implement a configuration management program to document and control the configuration of SNAS Product hardware, software, and support equipment. The implementation contractor will also establish and implement a data management system for the collection and dissemination of contractor-generated data and drawings.

Table 10-1. Implementation Contractor Deliverables

Implementation Contractor Document	Draft Due	Final Due
Product Management Plan	30 days after Implementation Start	PDR
Master Integrated Schedule	30 days after Implementation Start	Updated Monthly at MSR
Software Configuration Management Plan	30 days after Implementation Start	Reviewed and Updated Quarterly
Subsystem Requirements Document	PDR	CDR
System Design Specification	CDR	30 days after CDR
Internal Interface Control Document	30 days after PDR	CDR
Verification Plan and Procedures:	-	-
Verification Plan	60 days after CDR	120 days after CDR
Verification Procedures	120 days after CDR	30 days prior to TRR
Acceptance Test Report	15 days after completion of Final Acceptance Test	ORR
Deviation and Waiver Requests:	-	-
Deviation Requests	-	15 days prior to CDR
Waiver Requests	-	15 days after completion of Final Acceptance Test
Training Materials	60 days prior to TRR	TRR
SNAS Server Operator's Guide	60 days prior to TRR	TRR
SNAS Client User's Guide	60 days prior to TRR	TRR
SNAS System Configuration and Maintenance Guide	60 days prior to TRR	TRR

10.2.1.3 Quality Assurance

The implementation contractor will establish and maintain a QA program during all phases of SNAS development to ensure that all hardware and software meet the standards and tolerances as required by 450-PG-8730.3.1, the MSP Quality Assurance Plan.

10.2.2 System Design and Development

The implementation contractor will perform the planning, coordination, and implementation of the tasks required to develop the SNAS Product as designed. The implementation contractor will perform system design and development in a NASA-provided facility. During the course of the system design and development, the SNAS implementation contractor will prepare and deliver the following documentation:

- a. The SNAS Subsystem Requirements Document, in which the requirements from 452-SRD-SNAS are allocated to subsystems and specified in more detail, as required.
- b. The SNAS System Design Specification (SDS), which documents the software and hardware design of the SNAS.
- c. The SNAS Internal ICD, which documents the interfaces between the SNAS subsystems.

Prior to the development/manufacture of an item, the implementation contractor may submit a deviation request to NASA to depart from a particular performance or design requirement of a specification, drawing, or other document.

The schedule for the delivery of these documents is shown in Table 10-1.

10.2.3 Installation, Integration, and Test

The implementation contractor will develop and implement an integration and test program to assure that the SNAS Product meets all requirements, as described in paragraph 11.2 of this document. The implementation contractor will conduct a TRR prior to the SNAS Final Acceptance Testing. The SNAS Verification Plan and Procedures document and the final Acceptance Test Report will be delivered in accordance with the schedule shown in Table 10-1.

A waiver request may be submitted to NASA by the implementation contractor for an item that is found to depart from specified requirements, but is still considered suitable for use "as is."

The implementation contractor will also provide assistance to the SNAS O&M staff in the preparation of the appropriate documentation required for the installation of the SNAS hardware at the operational site.

10.2.4 Transition to Operations

The implementation contractor will develop plans, procedures, and training materials for the providing of training to SNAS O&M personnel regarding the maintenance and operation of the SNAS system and component subsystems. This includes the

preparation and delivery of SNAS O&M Manual(s), and the support of any required logistics support planning. The implementation contractor will also prepare any agreements and plans required for transition to operations, and a SNAS User's Guide for the SN customers that will be using SNAS for their SN scheduling and real-time operations.

The implementation contractor will conduct the following training:

- a. Training of SNAS O&M personnel on the O&M of the SNAS Product.
- b. Training of SN customers on the use of the SNAS client.

10.3 SNAS Systems Engineering Support

The SNAS Product systems engineering support contractor will provide to the SNAS PDL engineering and product management support under the MPS SES contract, independent of the SNAS implementation activities. Specific systems engineering support tasks will include, but not be limited to, the following:

- a. Maintain the Government-level SNAS documentation:
 1. 452-PMP-SNAS, the SNAS PMP (this document).
 2. 452-SRD-SNAS, the SNAS SRD.
 3. 452-OCD-SNAS, the SNAS OCD.
 4. 452-ICD-DAS/SNAS, the DAS/SNAS ICD.
 5. 452-SP-SNAS, the SNAS Security Plan.
 6. 452-PVM-SNAS, the SNAS Performance Verification Matrix (PVM).
- b. Conduct ad hoc engineering studies, analyses, trade studies, and technology assessments, as required.
- c. Perform technical reviews of all SNAS documentation delivered by the SNAS implementation contractor, and provide recommendations to the SNAS PDL.
- d. Develop the plan to transition existing SN customer support from UPS and SWSI to SNAS. Assist the SNAS PDL as required in the implementation of this plan.
- e. Assist the SNAS PDL in product management activities as directed (e.g., coordination with other Government and/or contractor organizations, maintain the SNAS Action Item database, assist in the preparation and distribution of SNAS meeting minutes, preparation of SNAS-related presentations, assist in the tracking of top problems and risks, etc.).

10.4 SNAS CM and DM Support

The SNAS Product CM/DM support contractor will provide to the SNAS PDL CM and DM support under the PAAC-II contract. Specific tasks will include, but will not be limited to, the following:

- a. Establishing and maintaining CM baselines.
- b. Establishing and maintaining Peer Review Board (PRB) functions.

- c. Supplying QMS audit support.
- d. Establishing a source file library.
- e. Scheduling documentation reviews.
- f. Coordinating meetings and reviews, and supporting teleconferencing.

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Section 11. Performance Assurance

11.1 Performance Assurance Planning

11.1.1 Performance Assurance Goals

The SNAS Performance Assurance goals are:

- a. Demonstrate that the SNAS complies with the established requirements.
- b. Demonstrate that the Product goals for system quality, reliability, operability, maintainability, availability, capacity, and life cycle cost have been attained.
- c. Conduct all testing in such a manner that is transparent to current SN customers and operations to the maximum extent possible.

11.1.2 Performance Assurance Strategy

The SNAS Performance Assurance strategy is intended to minimize the risk that Product requirements are not met while maximizing the usefulness of the data obtained from each step of the test process. The elements of this strategy are:

- a. Ensure the traceability of every requirement from conception to system acceptance.
- b. Structure the performance verification process such that the chance of exposing a previously undetected error is maximized while the overall cost of testing and demonstration is minimized.
- c. Demonstrate the viability of high-risk components or designs early in the implementation phase.
- d. Maximize in-plant demonstration to show that design concepts and requirements as well as maintainability requirements have been met.

11.2 Preliminary Product Validation Plan

The SNAS Product systems engineering support contractor will prepare and deliver a SNAS SRD and a top level PVM. The PVM will be a primary tool used in tracking performance validation and verification. Requirements from the SNAS SRD will be allocated to the SNAS subsystems for implementation. Allocated requirements will be subject to verification. SRD requirements will be mapped into the PVM to SNAS subsystems. The PVM will be maintained throughout the Product duration and will serve as a quality record to be used during internal audits.

A SNAS Verification Plan and Procedures document will be developed. This documentation will define the plan for verifying SNAS capabilities and enumerate step-by-step items that must be accomplished to carry out the plan. All verification will be formally documented and a final Acceptance Test Report will be published upon the completion of all SNAS verification.

11.3 Document Review

All Product documents will be reviewed and approved by the SNAS PDL in accordance with the schedule provided in Table 10-1 of this document. The implementation contractor will prepare and maintain a table listing the documents to be prepared for this Product. The table will identify for each document the document name, the date the format was approved, the current status, the date drafts are delivered for approval, and the approval date. This table will be included in the presentation package presented at the SNAS MSR.

11.4 Lessons Learned

The SNAS PDL will search the NASA Lessons Learned Information System (LLIS) for lessons that are applicable to the SNAS Product. Lessons learned from SNAS development will be documented in the NASA LLIS at <http://llis.gsfc.nasa.gov/>.

Section 12. Environmental Impact

The SNAS Product will be installed at an existing SN facility. The type of equipment to be installed is entirely consistent with equipment already installed in this facility. There is no environmental impact from the development and installation of the SNAS Product.

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Section 13. Safety

The SNAS implementation will comply with the safety policies and procedures established in NASA Procedural Requirements (NPR) 8715.3, NASA Safety Manual.

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Section 14. Security

The SNAS implementation will comply with the security policies and procedures established in the following documents, and do not include any additional security requirements:

- a. NASA Program Directive (NPD) 2810.1, NASA Policy for Security of Information Technology.
- b. NPR 2810.1, Security of Information Technology.
- c. GPG 2810.1, Security of Information Technology.
- d. 290-004, Internet Protocol Operational Network (IONet) Access Protection Policy and Requirements.

A security risk assessment and IT security contingency planning will be performed, and system rules of behavior will be developed and distributed. An authorization to process will be obtained prior to the connection of SNAS to the NISN IONet, and a SNAS system administrator will be appointed.

SNAS compliance with the above security policies and procedures will be documented in 452-SP-SNAS, the Space Network Access System (SNAS) Security Plan.

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Section 15. Technology Assessment

The SNAS Product will utilize a combination of new and existing technology related to network-based information systems. Technology assessments will be performed during the Product design phase to ensure that SNAS is using the best technological resources possible in the development of the system.

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Section 16. Commercialization

The SWSI Product, upon which the SNAS Product architecture is based, is registered as new technology with the GSFC Technology Commercialization Office (TCO). New initiatives developed during the course of SNAS Product implementation will also be coordinated with the GSFC TCO, in support of the ongoing MSP goal of supporting the development of commercial applications for MSP technologies. In addition, the SNAS Product will attempt to leverage existing commercial technology through the use of COTS software and hardware in the development of the system.

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Section 17. Reviews

17.1 General

Milestone and periodic reviews will be conducted to measure the SNAS performance and compare that performance with the Product Plan. Reviews will address, at a minimum, technical achievements, adherence to schedules, projected costs, issues concerns, plans for addressing previously unanticipated occurrences, and other Project metrics.

17.2 Peer Review Plan

The SN Project Peer Review Team will support a series of comprehensive system level milestone reviews. The primary objective of these reviews is to enhance the probability of success of the SNAS development and deployment.

The SNAS SRR, PDR, CDR, and ORR have been designated Peer Reviews. These reviews will be conducted in accordance with GPG 8700.6, Engineering Peer Reviews. The schedule for the SRR, SDR, and ORR is as shown in Figure 7-1.

17.2.1 SRR

The SRR will present the functional requirements and specifications for the SNAS to ensure that the Product is proceeding toward the objectives in a logical manner and that adequate consideration has been given to all facets of the Product.

17.2.2 PDR

The PDR will be conducted to ensure that all requirements have been allocated to system, subsystem and component levels. Functions performed by each system element will be documented, as well as the format and content of each system element's inputs and outputs. Risk areas will be assessed on a technical, cost, and schedule basis.

17.2.3 CDR

The CDR will be conducted to ensure that the design of each element of the system is expected to meet the functional, performance, and interface requirements. Hardware design, software design, and the physical layout of the equipment will be reviewed. Risk areas will be assessed on a technical, cost, and schedule basis.

17.2.4 ORR

The objective of the ORR is to determine the readiness of the SNAS to support customer services. This review will be conducted after the integration of the SNAS into the SN and will present the integration and test results. The ORR will baseline the capabilities, performance, and operational characteristics of the SNAS.

17.3 Other Reviews

17.3.1 TRR

The objective of the TRR is to ensure that SNAS system test procedures are completed and to ensure that the project is prepared for Final Acceptance Testing. Test plans and procedures will be evaluated for compliance with the PVM.

17.4 Periodic Reports

17.4.1 MSRs

The implementation contractor and system engineering support contractor will present a monthly review to the SNAS PDL to cover the current status of all technical, schedule related, and resource aspects of the Product, and to demonstrate progress in achieving scheduled Product milestones.

17.4.2 Action Item Report

The systems engineering support contractor will submit an action item report periodically to ensure that required actions are clearly defined, responsibility assigned, and progress tracked. The report will indicate which items are closed and the rationale for closure, which items are open, and the scheduled closure date. This report will note if any changes in the progress/status of action items have changed since the last report.

17.4.3 Top Problems/Issues Report

The systems engineering support contractor will submit a monthly report of the top problems/issues that have been identified by the SNAS PDL in conjunction with the reviews.

Appendix A. Deliverable Document Descriptions

The following are descriptions of the documentation deliverables required of the SNAS implementation contractor as listed in Table 10-1 of this document. The implementation contractor may use contractor format for these documents.

A.1 Product Management Plan

The Product Management Plan (PMP) will define the implementation contractor's planned method for managing the development of the Product. It will include the following, at a minimum:

- a. The overall Product Management Approach:
 1. Concise description of contractor WBS tasks, mapped to the Product WBS shown in Section 9 of this document, and how the tasks will be accomplished.
 2. Flow diagram (logic network) showing tasks, subtasks, interrelationships, and time-phasing.
 3. Milestone schedule with start and completion dates.
 4. Time-phased staff loading by organization, task, and major subtask for contractor and key subcontractors.
 5. Subcontractor management and control.
 6. Product risk management, including technology, schedule, and cost risks.
 7. Productivity approach.
 8. Approach for interfacing with NASA.
 9. Product assurance approach.
 10. System integration approach.
 11. Configuration management approach.
 12. Approach for training O&M personnel.
- b. The Product Control Organization:
 1. Contractor organization charts showing key personnel.
 2. Contractor management authority and responsibility chain.
 3. Relationship of contractor organization to subcontractors including lines of authority.
 4. Major subcontractor organization charts showing key personnel.

A.2 Master Integrated Schedule

The Master Integrated Schedule will document the milestones necessary to ensure that Product requirements are met on time. It also will provide detailed task information to assist NASA and implementation contractor management in assigning the necessary

resources to meet the established Product milestones. The Schedule will be prepared and maintained as a Tracking Gantt schedule. The baseline for all tasks will be established upon NASA approval of the initial Schedule delivery, and will be modified only after receiving approval from the NASA. Changes will be clearly shown in comparison to the baseline. Progress for each task will be clearly shown on the Schedule.

The Master Integrated Schedule will include, as a minimum:

- a. Major Product milestones.
- b. Product management activities.
- c. Detailed design activities.
- d. Detailed development activities.
- e. Procurement schedules and delivery dates.
- f. Shipping schedule.
- g. Integration and test activities.
- h. Site preparation and installation activities.
- i. Training schedule.
- j. Delivery milestones for all Product documentation.

A.3 Software Configuration Management Plan

The Software Configuration Management Plan will document the method in which the quality and integrity of the SNAS software work products will be established and maintained.

A.4 Subsystem Requirements Document

The Subsystem Requirements Document will define the detailed functional and performance requirements for each Product subsystem. It will provide an overview of the subsystems and will allocate functional, performance, interface, and operational requirements to each subsystem. These requirements will include those related to system performance parameters, operation, staffing, maintenance functions, and logistic support to the subsystem. As a minimum, the following will be included for each subsystem:

- a. Subsystem architecture.
- b. Functional requirements.
- c. Performance requirements.
- d. Interface requirements.
- e. Operational requirements.
- f. Reliability, maintainability, and availability requirements (hardware only).
- g. Physical and environmental requirements (hardware only).
- h. Security requirements.

- i. Human engineering and safety requirements (hardware only).

A.5 System Design Specification

The System Design Specification will describe in detail the hardware and software design for the SNAS Product, to include the architectures, interfaces (both internal and external), subsystem designs, and software module definitions. As applicable, the document will include a description of how existing (reuse or COTS) software is suitable for use and complies with current assurance and performance requirements.

A.6 Internal Interface Control Document

The Internal ICD will define the functional, performance, and physical characteristics of the major internal interfaces of the Product. The ICD will describe the interfaces necessary to allow hardware, software, and operational service compatibility internal to the Product. The document will include details of operator and special purpose hardware/software system interfaces. Specific data formats will be addressed. Drawings, schematics, and tables will be included as necessary to define the interface characteristics.

A.7 Verification Plan and Procedures

This document will provide the detailed approach and schedule for accomplishing the acceptance verification program. It will define the specific tests, demonstrations, analyses, and inspections that will verify that the system complies with the Product requirements. It also will provide the procedures for a failure-free acceptance verification at the system level.

A.7.1 Verification Plan

The Plan portion of the document will delineate the tests, demonstrations, analyses, and inspections and acceptance criteria to be used to verify Product requirements at the system level. The Plan will also include the schedule for the tests and demonstrations. The process for regression testing will be included in the Plan.

The Plan will provide detailed descriptions of all aspects of system-level verification, covering such items as:

- a. Purpose of each test/demonstration/analysis/inspection.
- b. Definition of each test/demonstration/analysis/inspection.
- c. Hardware/software to be tested.
- d. Test support requirements/environments.
- e. Criteria for acceptance/rejection.
- f. Schedule of tests/demonstrations.
- g. Verification management.

A.7.2 Verification Procedures

The Procedures portion of the document will define the specific objectives, event sequences, support requirements, configuration identification, and step-by-step procedures for each test/demonstration to be performed during Final Acceptance Testing at the system level. It will include detailed descriptions of pretest requirements, input data, test limitations, expected results, and the overall test schedule (test schedule includes pretest briefing, formal conduct of the test/demonstration, and debriefing).

The Procedures will identify the requirements for the item under test and will follow the outline of the Plan. Individual requirements will be verified in such a manner that expedites review of the acceptability of the item under test. The Procedures will be written such that they are concise, easily understood by testing personnel, and establish definitive accept/reject criteria for the items under test.

As a minimum, the following information will be included in the Procedures:

- a. Nomenclature and identification of the test article or material.
- b. Identification of objectives and criteria to be inspected or tested, including values, with tolerances, for acceptance or rejection.
- c. Description, in sequence, of steps and operations to be taken.
- d. Identification of system resources and computer software required.
- e. Identification of measuring, test, and recording equipment to be used, specifying range, accuracy, and type.
- f. Certification that required computer test programs, support equipment and test software have been verified prior to use with hardware under test.
- g. Any special instructions for operating data recording equipment or other automated test equipment as applicable.
- h. Layouts, schematics, or diagrams showing identification, location, and interconnection of test equipment, test articles, and measuring points.
- i. Identification of hazardous situations or operations.
- j. Precautions and safety instructions to insure safety of personnel and to prevent degradation of test articles and measuring equipment.
- k. Constraints on inspection or testing.
- l. Detailed procedures for data reduction and analysis of test results.
- m. Detailed identification/description of input data and resultant data flows.

The Procedures will be prepared in a logical format. The format may provide blank forms for recording test results and narrative comments in order that the completed Procedure serve as part of the Acceptance Test Report.

A.8 Acceptance Test Report

The Acceptance Test Report will document the results of the formal system verification. It will contain a log recording the exact history of the verification. It will describe in detail

any deviations from the Verification Procedures. It will contain an overall evaluation of the functional capabilities of the system as demonstrated by the verification. It will include any deficiencies, limitations, or constraints inherent in the system that were detected during verification.

As a minimum, the following will be included in the Report:

- a. Identification of the specific test as shown in the Verification Procedures.
- b. Identification of the requirements to be verified.
- c. Identification of the software and hardware versions used.
- d. References. Applicable Verification Plan and Procedures.
- e. Verification Results, to include:
 1. Identification of those planned objectives for which actual test results were identical with the expected results as specified in the Procedures or for which variation between actual and expected results were within specified tolerance. For the latter case, test results will be shown;
 2. Identification of those planned objectives for which actual test results differ from expected results beyond specific limits;
 3. Identification of any planned test objective for which actual results were not obtained. Reasons for not fulfilling such objectives will be stated;
 4. Identification of any false or aberrant behavior noted during the test or subsequent analysis. Note that any such behavior that can prevent the system or subsystem from accomplishing its mission objectives can be a basis for rejection.
 5. Recommendations for subsequent action will be stated, based on the verification results, and may include:
 - (a) Redesign of a particular hardware or software component to enable the system or subsystem to meet a specific requirement which was not fulfilled
 - (b) Revision to the SNAS SRD or the Subsystem Requirements Document in cases where verification results disclose ambiguity or conflicting requirements.
 - (c) Conducting additional verification to fulfill objectives for which results were not accepted.
 6. Verification Plan and Procedure Changes. Any deviations from the approved Plan/Procedures that were followed during the official conduct of the verification will be documented as revision pages to the affected documents and will be appended to the Report.

A.9 Deviation and Waiver Requests

A.9.1 Deviation Requests

A deviation request will be submitted when the contractor desires prior to manufacture of an item (either software or hardware) to depart from a particular performance or design requirement of a specification, drawing, or other document for a specific number of units or a specific period of time. A deviation differs from an engineering change in that an approved change requires a corresponding revision of the documentation defining the affected item, whereas a deviation does not contemplate revision of the applicable specification or drawing.

Each deviation request will be prepared as a form. The request form may use contractor format, but must include the following information:

- a. Deviation Request Number (for example, "SNAS-D01", "SNAS-D02", etc.
- b. Name of submitting engineer.
- c. Date submitted.
- d. Title of deviation request.
- e. Detailed description of the requirement, to include the requirement number, for which the request is being made (multiple requirements may be contained in the same request when the reason for the request is the same for all requirements).
- f. Detailed information regarding the reasons for the request.
- g. Detailed description of the impact to the system.
- h. Identify any adverse impact to cost and/or schedule.
- i. Implementation contractor Product Manager's signature and date of signature.
- j. A space for the NASA PDL's assessment (Approval or Disapproval), signature, and date of signature.

A.9.2 Waiver Requests

A waiver request will be submitted by the contractor for an item (either hardware or software) which is found to depart from specified requirements during production or after having undergone requirement verification, but nevertheless is considered suitable for use "as is" or after rework by an approved method.

Each waiver request will be prepared as a form. The request form may use contractor format, but must include the following information:

- a. Waiver Request Number (for example, "SNAS-W01", "SNAS-W02", etc.
- b. Name of submitting engineer.
- c. Date submitted.
- d. Title of waiver request.

- e. Detailed description of the requirement, to include the requirement number, for which the request is being made (multiple requirements may be contained in the same request when the reason for the request is the same for all requirements).
- f. Detailed information regarding the reasons for the request.
- g. Detailed description of the impact to the system.
- h. Identify any adverse impact to cost and/or schedule.
- i. Implementation contractor Product Manager's signature and date of signature.
- j. A space for the NASA PDL's assessment (Approval or Disapproval), signature, and date of signature.

A.10 Training Materials

The SNAS training materials will support the basic training of operations and maintenance personnel. Training materials will consist of the following:

- a. Instructor handbook.
- b. Textbook.
- c. Display book.
- d. Student workbook.
- e. Academic and performance tests.
- f. Training aids.

A.11 SNAS Server Operator's Guide

The SNAS Server Operator's Guide will provide the procedures and information necessary to operate the SNAS servers. The document will include the following, at a minimum:

- a. SNAS overview.
- b. General operating guidelines.
- c. Instructions on how to configure and execute server applications.
- d. Instructions on SNAS database administration.
- e. System administration procedures, to include customer setup instructions.
- f. Instructions on security and access management.
- g. Alert information.

A.12 SNAS Client User's Guide

The SNAS Client User's Guide will provide detailed instructions for operating the SNAS Client software in support of SN customer mission operations. The document will include the following, at a minimum:

- a. SNAS overview.
- b. Client installation and setup instructions.

- c. General operating guidelines.
- d. Startup and login instructions.
- e. Scheduling instructions.
- f. Service reconfiguration instructions.
- g. Performance data monitoring instructions.
- h. Instructions regarding state vector management.
- i. Alert information.

A.13 SNAS System Configuration and Maintenance Guide

The SNAS System Configuration and Maintenance Guide will document the necessary information and guidelines for DSMC management to configure and maintain the SNAS hardware and software, and to meet the requirements for contingency and disaster recovery planning within the SN.

Abbreviations and Acronyms

AGILE	Astro-rivelatore Gamma a Immagini LEggero
CANDOS	Communications and Navigation Demonstrations on Shuttle
CCB	Configuration Control Board
CCR	Configuration Change Request
CDR	Critical Design Review
CM	Configuration Management
C/NOFS	Communication/Navigation Outage Forecasting System
COTS	Commercial Off-the-Shelf
CY	Calendar Year
DAA	Designated Approving Authority
DAS	Demand Access System
DCN	Document Change Notice
DM	Data Management
DSMC	Data Services Management Center
EOS	Earth Observing System
ERBS	Earth Radiation Budget Satellite
ESA	European Space Agency
FUSE	Fast Auroral Snapshot Explorer
FY	Fiscal Year
GALEX	Galaxy Evolution Explorer
GLAST	Gamma-ray Large Area Space Telescope
GPG	Goddard Procedures and Guidelines
GP-B	Gravity Probe-B
GPM	Global Precipitation Measurement
GRGT	Guam Remote Ground Terminal
GSFC	Goddard Space Flight Center
HDBK	Handbook

HST	Hubble Space Telescope
ICD	Interface Control Document
IONet	IP Operational Network
IP	Internet Protocol
ISS	International Space Station Program
LDBP	Long Duration Balloon Program
LLIS	Lessons Learned Information System
MAP	Microwave Anisotropy Probe
MIL	Military
MOC	Mission Operations Center
MSOCC	Multisatellite Operations Control Center
MSP	Mission Services Program
MSR	Monthly Status Review
NASA	National Aeronautics and Space Administration
NCC	Network Control Center
NCCDS	Network Control Center Data System
NENS	Near Earth Networks Services
NHB	NASA Handbook
NISN	NASA Integrated Service Network
NPD	NASA Program Directive
NPOESS	National Polar-orbiting Operational Environmental Satellite System
NPR	NASA Procedural Requirements
OCD	Operations Concept Document
O&M	Operations and Maintenance
ORR	Operations Readiness Review
PAAC-II	Program Analysis and Control
PCD	Project Commitment Document
PDL	Product Design Lead
PDR	Preliminary Design Review

PG	Procedures and Guidelines
PMP	Product Management Plan
PRB	Peer Review Board
PVM	Performance Verification Matrix
QA	Quality Assurance
QMS	Quality Management System
SDS	System Design Specification
SES	Systems Engineering Support
SN	Space Network
SNAS	Space Network Access System
SORCE	Solar Radiation and Climate Explorer
SPM	Special Projects and Missions
SRD	System Requirements Document
SRR	System Requirements Review
SSL	Secure Socket Layer
SSP	Space Station Program
STGT	Second TDRSS Ground Terminal
STS	Space Transportation System
SWSI	SN Web Services Interface
TBD	To Be Determined
TBR	To Be Resolved.
TCO	Technology Commercialization Office
TCP	Transmission Control Protocol
TDRS	Tracking and Data Relay Satellite
TDRSS	Tracking and Data Relay Satellite System
TIMED	Thermosphere, Ionosphere, Mesosphere Energetics and Dynamics
TOPEX	Ocean Topography Experiment
TRMM	Tropical Rainfall Measuring Mission
TRR	Test Readiness Review

UARS	Upper Atmosphere Research Satellite
ULDBP	Ultra Long Duration Balloon Program
UPS	User Planning System
WBS	Work Breakdown Structure
WOA	Work Order Authorization
WSC	White Sands Complex
WSGT	White Sands Ground Terminal
XTE	X-Ray Timing Explorer

Change History Log

Revision	Effective Date	Description of Changes
Baseline	January 2004	Original

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